

C1 ~~Claim 1~~ of a plasma generating device, the system of etching agents including one or more fluorine-containing compounds, chlorine and an optional inert carrier gas.

Claim 3, line 2, change "a photoresist" to --the photoresist--.

REMARKS

Favorable reconsideration of this application in light of the following remarks is respectfully requested.

Claims 1-22 are currently pending with Claims 14 and 15 being withdrawn from consideration as being drawn to a non-elected invention. Claims 14 and 15 have been canceled and Claim 1 has been amended to incorporate a feature of Claim 3, i.e., the exposed areas of the ARC removed during the claimed process are areas exposed previously during etching of a photoresist overlying the ARC. The remaining independent claims (Claims 11 and 22) set forth similar features concerning the areas of the ARC removed according to the claimed process.

Claims 1-4, 6, 8-12, 16, 17, 19 and 20 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 5,554,560 ("Hsue") in view of U.S. patent No. 5,514,247 ("Shan"). The reasons for the rejection are set forth in paragraph 4, on pages 2-4 of the final Official Action. This rejection is respectfully traversed for the following reasons.

Claim 1 sets forth a process for removing exposed areas of an organic ARC on a metallic layer, the exposed areas of the ARC having been exposed by previously etching a

photoresist covering the ARC. The process comprises exposing the exposed areas of the ARC to an oxygen-free system of etching agents in an ionized state in a reaction chamber of a plasma generating device, the system of etching agents including one or more fluorine-containing compounds, chlorine and an optional inert carrier gas. **The claimed process is not suggested by the applied references since neither Hsue nor Shan discloses or suggests plasma etching areas of an organic ARC through a photoresist.**

As explained previously, Hsue discloses a **planarizing etch back** of an ARC which is either a spin-on-glass or a polymer (see page 4 of November 24, 1999 Amendment and column 4, lines 34-67 and column 5, lines 31-49 of Hsue). As such, there is no photoresist covering the ARC and there are no exposed areas of the ARC which would be etched during **Hsue's planarizing etch back**.

Shan cannot possibly cure the deficiencies of Hsue since Shan relates to a totally different process than **Hsue's planarizing etch back**. That is, Shan relates to a process of etching vias through a dielectric material such as silicon dioxide over silicon (see column 1, lines 6-11; column 2, lines 47-53; and column 3, lines 40-48 of Shan). In Shan, a dielectric film is patterned by photoresist lithography and a TiN ARC is located over an aluminum metal layer (see column 3, lines 33-54 of Shan). Accordingly, whereas Hsue conducts a **planarizing etch back**, Shan provides a photoresist on a dielectric layer which overlies a TiN ARC. As such, neither Hsue nor Shan relates to the claimed process wherein areas of an organic ARC exposed by previously etching a photoresist covering the ARC are etched with an oxygen-free system of etching agents.

In summary, Hsue subjects an ARC (leveling layer 20) over a field oxide 12 to a **planarizing etch back** to reduce the ARC and the field oxide structure 12 to a predetermined depth below the original top surface of a silicon nitride layer 16 (see column 4, lines 34-38 and column 5, lines 11-15 of Hsue). Shan, on the other hand, etches vias in a dielectric layer overlying a TiN ARC (see column 5, lines 24-25 of Shan). Accordingly, even if Shan is combined with Hsue in the manner suggested in the Official Action, there still is no suggestion of etching areas of Hsue's ARC exposed by previously etching a photoresist covering Hsue's ARC.

A further reason why the claimed process is patentable over the cited references is that neither Hsue nor Shan discloses or suggests the claimed etching gas. That is, the etch gas disclosed in Hsue is for etching spin-on-glass (see column 5, lines 11-38 of Hsue) and the etch gas disclosed in Shan includes a main etch gas for etching silicon dioxide and an overetch gas for etching TiN (see column 5, lines 30-37 of Shan). As such, merely adding Shan's metal scavenging chlorine (see column 4, lines 55-63 of Shan) to Hsue's etch gas cannot possibly produce the claimed process.

Claims 5, 7, 13, 18, and 21 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hsue in view of Shan for the reasons set forth in paragraph 4, on page 4 of the final Official Action. It is submitted, however, that Claims 5, 7, 13, 18, and 21 are allowable for at least the reasons that Claims 1 and 11 are patentable over the cited references.

Claim 22 was rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hsue in view of Shan and further in view of the U.S. Patent No. 5,126,289 ("Ziger"). The reasons for the rejection are set forth in paragraph 5, on pages 4-5 of the final Official Action. This rejection is respectfully traversed for the following reasons.

Claim 22 is patentable over Hsue and Shan for the reasons discussed above in connection with Claims 1 and 11. That is, the processes of Hsue and Shan are so dissimilar that a person of ordinary skill in the art would not have been led to combine Hsue and Shan in a manner which would produce the claimed invention since neither reference relates to a process wherein areas of an organic ARC exposed by previously etching a photoresist covering the ARC are etched with an oxygen-free system of etching agents. Ziger, while relating to a process of providing a photoresist on a planarized upper surface of a polymer ARC, fails to suggest etching areas of an organic ARC (exposed by previously etching a photoresist covering the ARC) with an oxygen-free system of etching agents. Instead, Ziger uses a metal etch to simultaneously plasma etch the ARC 16 and underlying metal layer 11 with a halogen "such as CF₄ or CCl₄" (see column 2, lines 58-61 and column 3, lines 3-23 of Ziger). As such, the combination of Ziger with Hsue and Shan is not suggestive of the claimed process wherein areas of an organic ARC (exposed by previously etching a photoresist covering the ARC) are etched with an oxygen-free system of etching agents.

Application No. 09/002,007
Attorney's Docket No. 015290-238

Applicants submit that the differences between the claimed subject matter and the prior art are such that the claimed subject matter, as a whole, would not have been obvious at the time the invention was made to a person having ordinary skill in the art.

In view of the foregoing, Applicants submit that the present application is in condition for allowance and such action is earnestly solicited.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By: Peter K. Skiff
Peter K. Skiff
Registration No. 31,917

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620

Date: May 15, 2000